

SCOPE OF CLAIMS

1. An ultrasonic diagnostic apparatus comprising:

an ultrasound probe in which a plurality of transducer
5 elements for transmitting and receiving an ultrasonic wave
to/from an object to be examined are two-dimensionally
arranged;

transducer element selecting means for selecting the
transducer element used in ultrasound transmission and
10 reception;

signal processing unit for applying a delay time to a
received wave signal received by the selected transducer
element and performing signal processing;

image processing unit for generating an image on the
15 basis of a signal output by the signal processing unit; and

image display unit for displaying the image, wherein

the image processing unit includes storing means for
storing a first ultrasound image obtained by a scan performed
with a first transducer arrangement selected by the transducer
20 element selecting means and a second ultrasound image
obtained by a scan performed with a second transducer
arrangement selected by the transducer element selecting
means so as to irradiate an ultrasound beam in a different
direction than a beam direction of the first transducer
25 arrangement, and image calculating means for combining the
first ultrasound image and the second ultrasound image.

2. An ultrasonic diagnostic apparatus according to claim 1,
wherein a beam formed by the second transducer arrangement

intersects with that formed by the first transducer arrangement.

3. An ultrasonic diagnostic apparatus according to claim 1,
wherein the image calculating means generates the combined
5 image from tomographic information on a position where the
ultrasound beams of the first ultrasound image and of the
second ultrasound image intersect with each other.

4. An ultrasonic diagnostic apparatus according to claim 1,
10 wherein the first ultrasound image is obtained by moving an
aperture formed in the first transducer arrangement on a
surface of the ultrasound probe and the second ultrasound
image is obtained by moving an aperture formed in the second
transducer arrangement on the surface of the ultrasound probe.

15 5. An ultrasonic diagnostic apparatus according to claim 1,
wherein the second ultrasound image is collected on the same
portion as the first ultrasound image.

20 6. An ultrasonic diagnostic apparatus according to claim 1,
wherein the image processing unit reconstructs a
three-dimensional image from the plurality of ultrasound
images.

25 7. An ultrasonic diagnostic apparatus according to claim 1,
wherein the first ultrasound image is obtained by
two-dimensionally moving the aperture of the first transducer
arrangement on the surface of the ultrasound probe, and the
second ultrasound image is obtained by moving the aperture of

the second transducer arrangement in correspondence with a moving path of the first received signal.

8. An ultrasound diagnostic apparatus according to claim 1,
5 wherein the first transducer arrangement or the second transducer arrangement is a sparse array which forms a central position of ultrasound beams at a different position than that of ultrasound beams of the other transducer array.

10 9. An ultrasonic diagnostic apparatus according to claim 1, wherein a direction of beam of the first transducer arrangement coincides with a direction of a normal line with respect to a body surface of the object.

15 10. An ultrasonic diagnostic apparatus according to claim 9, wherein the first transducer arrangement is a ring-shaped aperture and the second transducer arrangement is a strip-shaped aperture.

20 11. An ultrasonic diagnostic apparatus according to claim 10, wherein the transducer elements forming the ring-shaped aperture are selected so that the distances from the respective transducer elements to a focal point are identical.

25 12. An ultrasonic diagnostic apparatus according to claim 10, wherein in the second transducer arrangement, an oblique angle of ultrasound beam is arbitrarily set by adjusting phasing data for each transducer element row.

13. An ultrasonic diagnostic apparatus according to claim 1, wherein in the first transducer arrangement or the second transducer arrangement, an oblique angle of ultrasound beam is arbitrarily set by adjusting phasing data for each transducer element row.

14. An ultrasonic diagnostic apparatus according to claim 1, wherein an arrangement surface of the transducer elements forms a convex shape in a direction of ultrasound transmission.

15. An ultrasonic diagnostic apparatus according to claim 1, wherein the first transducer arrangement or the second transducer arrangement is divided into a plurality of transducer groups, and each transducer group is provided with a phasing circuit.

16. An ultrasound imaging method using an ultrasound probe including two-dimensional array of transducer elements for transmitting and receiving an ultrasonic wave, comprising the steps of:

selecting the transducer element forming a first transducer arrangement and obtaining a first ultrasound image with an ultrasound scan;

selecting the transducer element forming a second transducer arrangement generating an ultrasound beam in a direction intersecting with a direction of beam of the first transducer arrangement and obtaining a second ultrasound image with an ultrasound scan;

storing the first ultrasound image and the second

ultrasound image;

combining the first ultrasound image and the second
ultrasound image; and

displaying the combined image.